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Occupational and educational information concerning 12 categories of engineering technicians and engineering technology is presented. This information covers the role of the technicians, student qualifications, typical job titles, and typical educational programs. The categories presented are (1) air conditioning, heating, and refrigeration, (2) architectural and building construction, (3) aviation and aerospace, (4) chemical, (5) civil, (6) electrical and electronics, (7) electronics and computers, (8) fluid power, (9) industrial, (10) mechanical, (11) metallurgical, and (12) nuclear. (EM)

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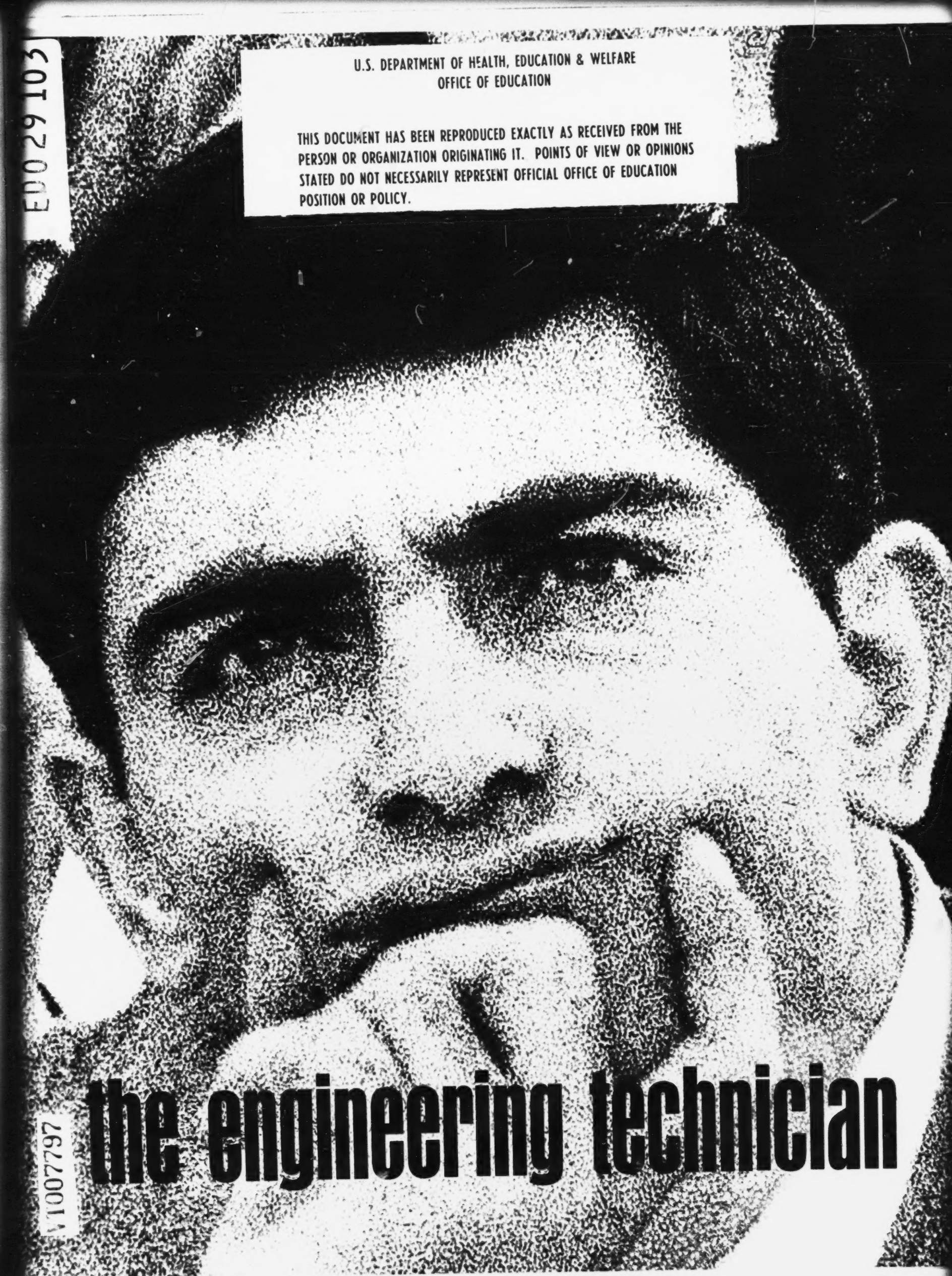

the engineering technician

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DEFINITION OF ENGINEERING

Engineering is the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind.

DEFINITION OF ENGINEERING TECHNOLOGY

Engineering Technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer.

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THE ENGINEERING TECHNICIAN

Your Place as an Engineering Technician

Have you watched
—a jet airliner landing?
—a rocket launching, "live" or on television?
—the antenna of a radar set rotating?
—modern farm machinery moving across a field?
—an automobile moving swiftly down a new highway?

Every time you see one of these familiar sights, you see a result of technology. Technology influences our most important efforts, from conquering space to harnessing the atom. The United States is truly the nation that technology has built.

The engineering team is the keystone of our technological world. This engineering team produces most of our new products, materials, and techniques. This team includes scientists, engineers, engineering technicians, and skilled craftsmen. And this team can include YOU.

If you prepare yourself to join this team as an engineering technician, you too will play a vital part in our industrial society. You too will contribute to progress in fields ranging from space exploration to new and better household appliances. The all-important work you do will bring you job recognition, security, and the chance for advancement.

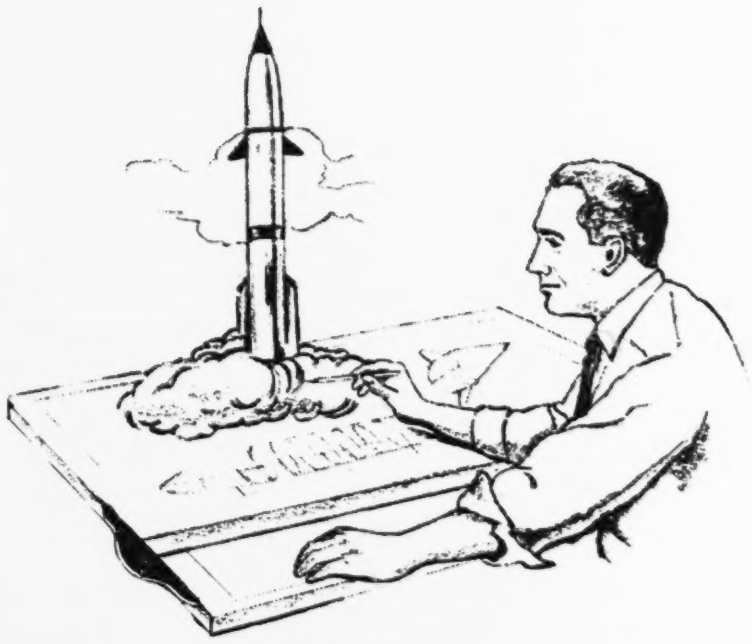
This booklet will tell you about the engineering team and your opportunities as an engineering technician—an essential member of the engineering team.

First, we should define the terms *engineering technology* and *engineering technician:*

> *Engineering technology* is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the area between the craftsman and the engineer in the part closest to the engineer.
>
> *An engineering technician* or *engineering technologist* is one whose education and experience qualify him to work in the field of engineering technology.

Therefore, as an engineering technician you will be concerned primarily with the application of established scientific and engineering knowledge and methods. You will apply your technical skills in solving technical problems.

In short, you will get things done as a member of the engineering team—scientists, engineers, engineering technicians, and skilled craftsmen. Engineers and scientists concern themselves with design, research, and advanced planning. However, today's scientists and engineers have less time than ever before for education in practical application.



As an engineering technician, therefore, you will assume much responsibility for translating ideas into practical applications. You will put the scientist's creativity into action. You will work with the engineer to take a design from idea to planning, and then to production.

As an engineering technician, you will find a wide range of important jobs open to you. Using the scientist's or engineer's designs and rough notes, you might draw plans for an improved control system for the latest rocket; or supervise manufacturing operations in many fields; or select and sell specialized equipment to meet your customer's technical requirements. You might work with engineers in building the pilot system for a new chemical or textile process; or assist in making surveys for new interstate highways; or aid in laying out new manufacturing plants and offices to assure the most efficient flow of men, materials, and paperwork.

As an engineering technician, you might work with and supervise lesser-trained technicians and skilled craftsmen. You might expedite work on production orders, program work schedules, and plan the production or service to be done by skilled workers.

Recognition

Recognition is only one of the benefits you will receive as an engineering technician. Your vital role on the engineering team is clear. National professional societies and accrediting agencies have testified that engineering technology is indispensable. So have industry and government—because every modern organization needs that person who gets things done.

Perhaps the best measure of this recognition is the credit given engineering technicians by professional engineering societies. For example, one of the major administrative groups in the American Society for Engineering Education (ASEE) is the Technical Institute Administrative Council, which is concerned with administrative and policy developments in engineering technology education. The ASEE also has a Technical Institute Division, which is responsible for academic developments in engineering technology education.

Thus, top leaders in engineering education welcome engineering technicians as team members and guide their educational programs.

The Engineers' Council for Professional Development (ECPD) is the nationally recognized accrediting agency for engineering programs. For many years the ECPD has also reviewed and accredited two-year engineering technology programs. More recently, the ECPD has been accrediting four-year baccalaureate programs in engineering technology.

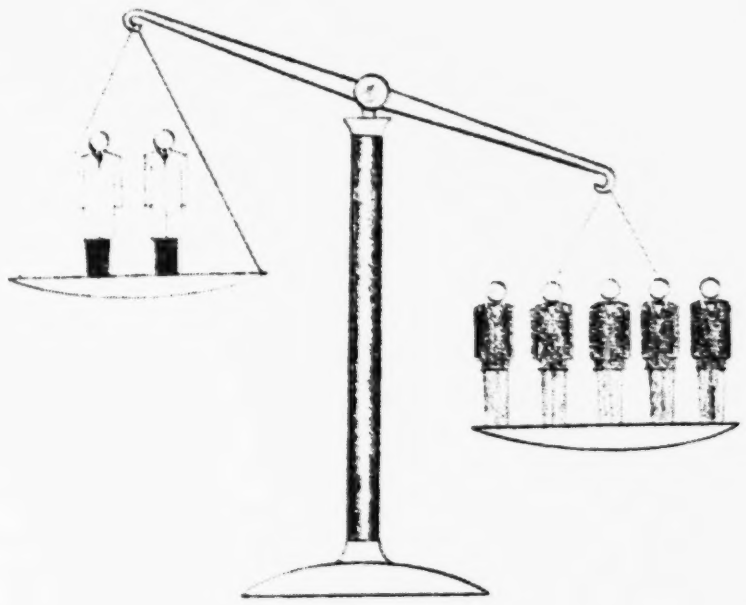
Many engineering technology schools are also accredited by regional accrediting agencies. These same agencies accredit other colleges and universities.

Most professional groups have licensing or certification for formal recognition. The Institute for the Certification of Engineering Technicians (ICET), sponsored by the National Society of Professional Engineers, certifies engineering technicians in these classifications: Junior Engineering Technician, Engineering Technician, and Senior Engineering Technician.

Certification by the ICET depends on experience, education, and recommendation by professional engineers. All applications for certification are reviewed by the ICET's Board of Trustees, which is made up of four registered professional engineers and four senior engineering technicians. More than 9,000 technicians have been certified in the last five years.

Opportunities

We have shown the recognition you will receive as an engineering technician. But what about career opportunities in engineering technology? You can sum these up in just three sentences: The demand for

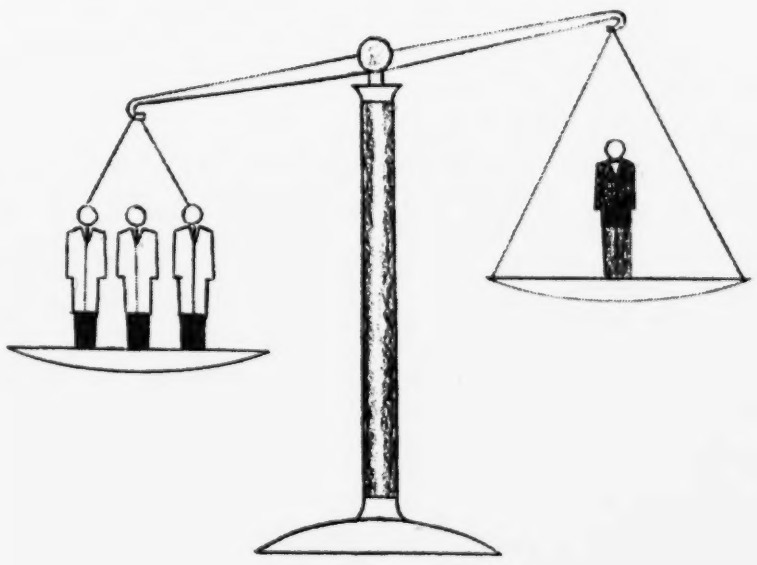


your services will be great. Your pay will be good. Your chances for advancement will be most attractive.

As an engineering technician, you will find the law of supply and demand working in your favor. In 1967 only two engineering technicians were graduated for every five engineers. The United States needs two or three engineering technicians for *each* engineer. There is, then, an extreme shortage of engineering technicians, and your career opportunities are excellent.

You will find a broad range of opportunity, with many clusters of jobs. For example, as a civil engineering technician, you might work in a research laboratory developing and testing new bridge, highway, or dam designs. Or you might work in an engineering firm, aiding in the design of all types of buildings; or as a salesman for a manufacturer of structural components; or as a supervisor on a construction project.

These are examples of careers you can expect as an engineering technician within the civil engineering technology field. You will find the same excellent



opportunities in any other field of engineering technology. The great breadth of every technical field will offer you a career which suits your personal interests and abilities.

Salary

As a well-trained engineering technician, you can expect a good starting salary just as soon as you graduate. Then, as you gain experience or pursue further education, you will have the opportunity to advance —both in salary and in responsibility.

In addition to the rewards of a good starting salary, excellent promotional prospects, and security, you will derive job satisfaction—the pleasure of knowing that because you did your job properly, the concrete will not fail, the automobile will be safe, the chemical analysis will be correct. You will work with your organization's top managers, engineers, and designers. You will have your "fingers on the pulse" of your organization's most important plans. Other team members will welcome your ideas, skills, and opinions. You will be respected as a vital member of your organization's staff. In short, you will build for yourself a responsible, secure, and satisfying future.

Naturally, the critical work demanded of you as an engineering technician requires that you have the necessary education and training. The next section will tell you about preparing yourself to join the engineering team.

Programs

Since World War II, technology has "boomed." This tremendous surge in technology has focused emphasis on technician education, making engineering technology among the most vital of all educational programs.

A variety of programs to teach engineering technicians have developed. You can study engineering technology in several kinds of colleges: technical institutes (colleges which specialize in engineering technology); junior or community colleges; and the technical divisions of some universities.

In academic level, engineering technology programs resemble other college programs, and usually lead to either a two-year or a four-year degree. However, you will find that most engineering technology programs are self-contained. That is, they prepare graduates for immediate employment in specialized fields of industry or science.

You should not confuse an engineering technology program with either pre-engineering programs or with vocational training programs. Pre-engineering programs usually duplicate the freshman and sometimes the sophomore years of four-year engineering colleges. Thus, they do not offer you the immediate career training provided by engineering technology programs.

Vocational training programs, designed to train other members of the engineering team, are themselves very important. However, they emphasize mechanical and manual skills rather than college-level subject matter. Vocational programs prepare young men and women for specific jobs while engineering technology programs will prepare you for clusters of careers in the broader fields of engineering technology.

In summary, an engineering technology curriculum offers you a planned sequence of college-level courses leading to a certificate, an associate degree, or a bachelor's degree in a field of engineering technology.

Two-year and three-year programs leading to associate degrees in engineering technology provide the basic education you need for success as an engineering technician. The bachelor's degree programs are broader in scope than the associate degree programs and will give you additional education in the humanistic studies essential to an understanding of our cultural heritage.

Some colleges now offer both two-year and four-year programs, with the content of the former counting toward requirements of the latter. A college's official catalog will show you programs available at that institution, plus any arrangements for moving into a four-year program upon completion of a two-year program.

Not everyone can join the engineering team. But since you have read this far, you are probably seriously considering a career in engineering technology, and you will want to know the requirements for entrance

into the program of your choice. You also should examine your own interests, to see whether you would enjoy working on the engineering team.

Qualifications

If you want to become an engineering technician, you should plan your education well ahead. First, you must earn a diploma from an accredited high school. Ideally, you should begin your high school planning in the tenth or eleventh grade. You should make certain that you take the subjects that best prepare you for a college-level engineering technology program.

A sound background in English, mathematics, and physical science is a basic requirement for entrance into a college-level program in engineering technology. A good high school program should include:

English. At least three, and preferably four units. To become a key man on the engineering team, you need a good command of the language. The very nature of your job will require you to communicate effectively with your fellow members of the engineering team.

Mathematics. Three units, two in algebra and one in plane geometry, or the equivalent in integrated modern mathematics. In addition, intermediate algebra and trigonometry are desirable preparation for engineering technology education.

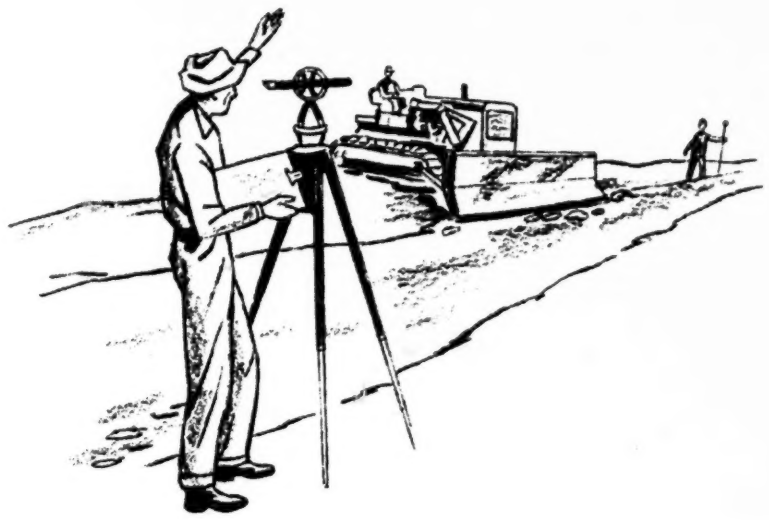
Physical science. At least one unit of chemistry or physics with laboratory work. Mathematics and physical science are the foundation of all branches of engineering technology. You should include as many advanced courses in mathematics and physical science as possible among your electives in high school.

Your outside interests and hobbies are a good indication of your natural inclination toward technical and scientific matters. You should be curious about how things work. Your work in engineering technology may not require exceptional manual and mechanical skills, but you should have some mechanical aptitude. Mechanical aptitude will aid you in using the instruments and equipment of your area of engineering technology.

Before you graduate from high school, you should consider which college you wish to attend. Accredited colleges require a high school transcript and many require scores on standardized tests. Some colleges require letters of recommendation. Other requirements, such as medical examinations, entrance examinations, and interviews, vary considerably from college to college.

For information about entrance to a particular college program in engineering technology, write to that college for a catalog and an application. Start early to get your application materials together, including the names of persons from whom you can get recommendations if needed.

You may now be enrolled in a college program, but may realize that you belong in an engineering technology program. Should you want to change, contact the registrar of the college to which you want to transfer, and ask him to evaluate your credits. Each college's policy on transfer credits depends on its own policies and requirements; however, most colleges accept some or all of the credits earned at another college.

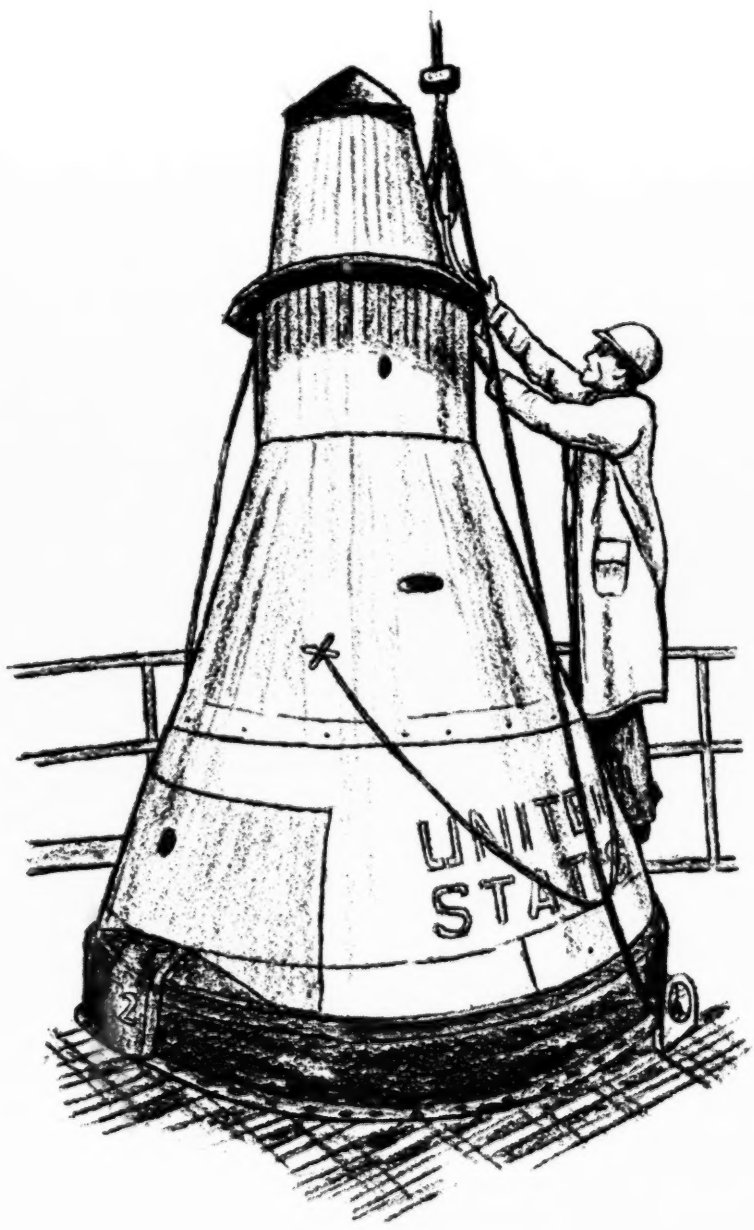


College Life

Going to college in an engineering technology program can be a wonderful experience. The study should fascinate you, as your instructors help you blaze your own trail into applied science.

You can participate in extracurricular activities such as clubs, professional organizations, and fraternities which sponsor social and professional meetings. Many schools hold dances, dinner meetings, or athletic events. Attending a school in an urban center can offer you plenty of off-campus entertainment.

A college catalog may list some of the student activities, but the best way to learn about a college's activities is to visit the campus or to interview a student or a graduate.



Military Service

Engineering technicians render vital service to the nation's defense effort. Many engineering technicians serve as noncommissioned officers or technical specialists. Others have gone to officers' candidate school and have earned commissions. Still others hold important supervisory or technical jobs in defense industries.

However, the draft policy affecting you depends considerably on your local draft board, and, if you belong to a reserve unit, on current military needs. Draft laws require the college student to register with his draft board and to keep it informed of his status. In granting deferments, draft boards require the student to maintain a minimum study load and to keep up his grades.

Whatever the nation's manpower needs, and whatever draft laws and military policies are in effect, you can be certain of one fact: Study in engineering technology will prepare you for more responsible assignments in military life just as in civilian life.

Cost

Your cost for an education in engineering technology will vary with your choice of school. It will depend on whether you live at home or in a dormitory, whether or not you can obtain a scholarship or

other financial aid, and how carefully you control your personal expenses. The college catalog will show you if the college offers dormitory accommodations and how much your room and board will cost.

At some colleges, engineering technology programs cost little more than the price of books and supplies. Other colleges charge different fees for in-state and out-of-state students. You can learn about each college's schedule of fees by studying its catalog.

In very few cases would you pay the entire actual cost of your education. Engineering technology programs require well-trained instructors and expensive equipment. In addition to the fees students pay, most colleges receive supplements from state or local governments, or interest funds from endowments.

Some colleges charge fees for special services, such as student activity fees, medical fees, and laboratory fees. Also, at most schools you buy your own books and supplies (sometimes furnished or rented by the school). The average cost of books and supplies alone would be about $150 per year, and your total costs (fees, room and board, books, supplies, and entertainment) may go as high as $1,800 per year.

You can almost always find the means to get an engineering technology education. If you do not believe you have enough money to attend the college of your choice, check its calalog for an explanation of its financial aid programs and how you can apply for help. The college catalog will tell you of many scholarships and other means of assistance that are available to engineering technology students.

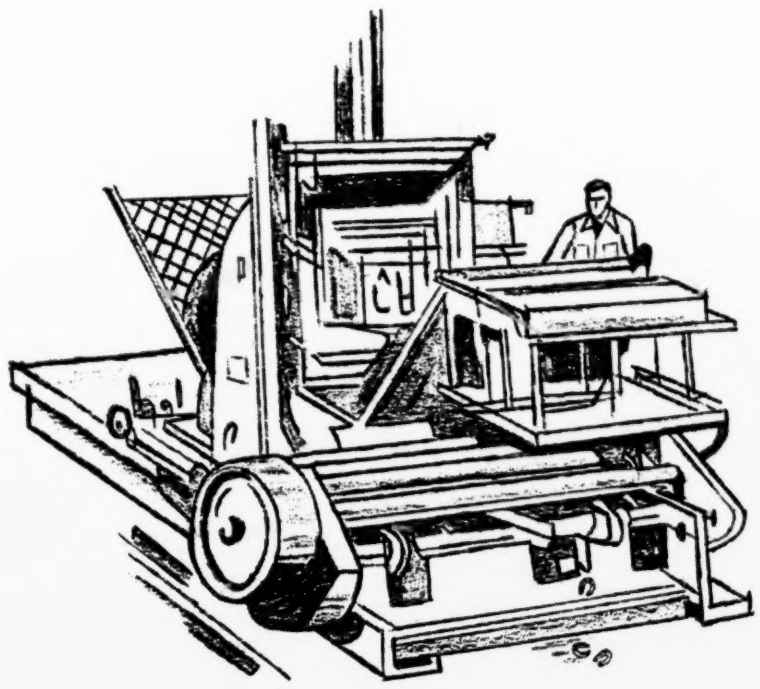
Some typical aid programs are straight scholarships, requiring only that you maintain your grades at a specified level; loans, which usually must be repaid after graduation; and work-study programs, in which you work a stated number of hours or at a stated rate.

Scholarships are usually of two types: those earned on the basis of high-school grades, and those awarded to deserving but financially needy students.

You may also borrow the money for your schooling. A loan can enable you to attend school full-time without having to do outside work. You can usually arrange to defer repayment until after graduation. The Higher Education Act of 1965 has made it easier for students to borrow money for schooling, and many banks and other financial institutions have loan programs especially designed for college expenses.

Under the provisions of Title I, Part C, of the Economic Opportunity Act of 1964, eligible students may earn some of their expenses through part-time work on the college campus. Each college administers its own work-study program. However, such a program may limit the amount of school work you can take.

The school you select may also offer other part-time jobs, or you may find work in the community. Part-

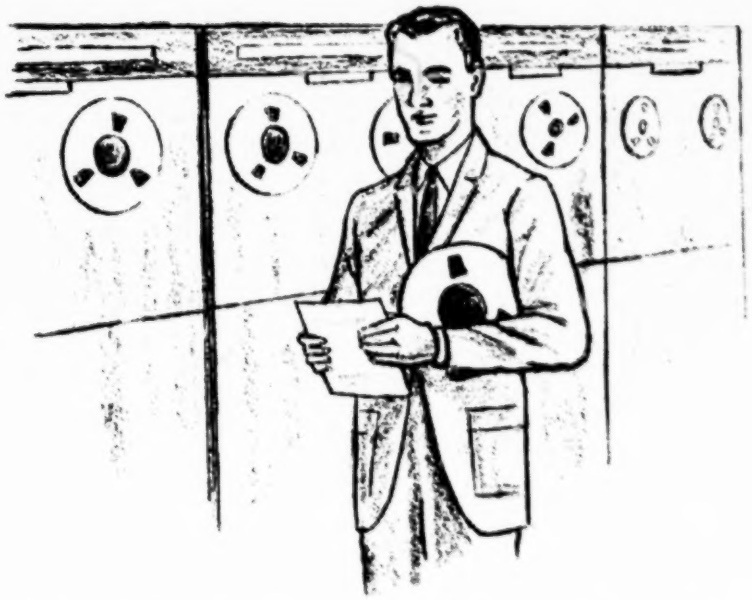


time work has carried many a student through an engineering technology program.

You may qualify for school attendance under the GI Bill if you are the son of a disabled or deceased veteran. For more information, apply to your nearest Veterans Administration Office.

Many colleges have cooperative programs, under which you attend school one term and work in industry the next. The co-op plan has several advantages. First, it gives you some practical work experience, because your work on the job relates to your schooling. Second, a co-op plan helps you pay your own expenses. Third, it helps you build contacts useful to you after graduation.

If your college has a cooperative program, the



catalog will tell you about it. Some colleges have co-op directors to help you set up your work/school programs.

Some engineering technology programs offer evening classes. By attending evening school, you may be able to carry a full-time job and get your education at the same time. However, a program in evening classes may take as much as twice the time to complete as will a full-time, day-class program.

Finally, your schooling costs in an engineering technology program will depend partly on how well you control your expenses. If you spend too much on food or entertainment, your total schooling costs will be high. If you have barely enough funds, take advantage of meal tickets, self-service laundries, purchases of used books, etc.

Regardless of cost, a college education in engineering technology is one of the best investments you can make. These educational costs will be repaid many times over in your life—because this type of education qualifies you for an excellent starting salary and later promotion.

After Graduation

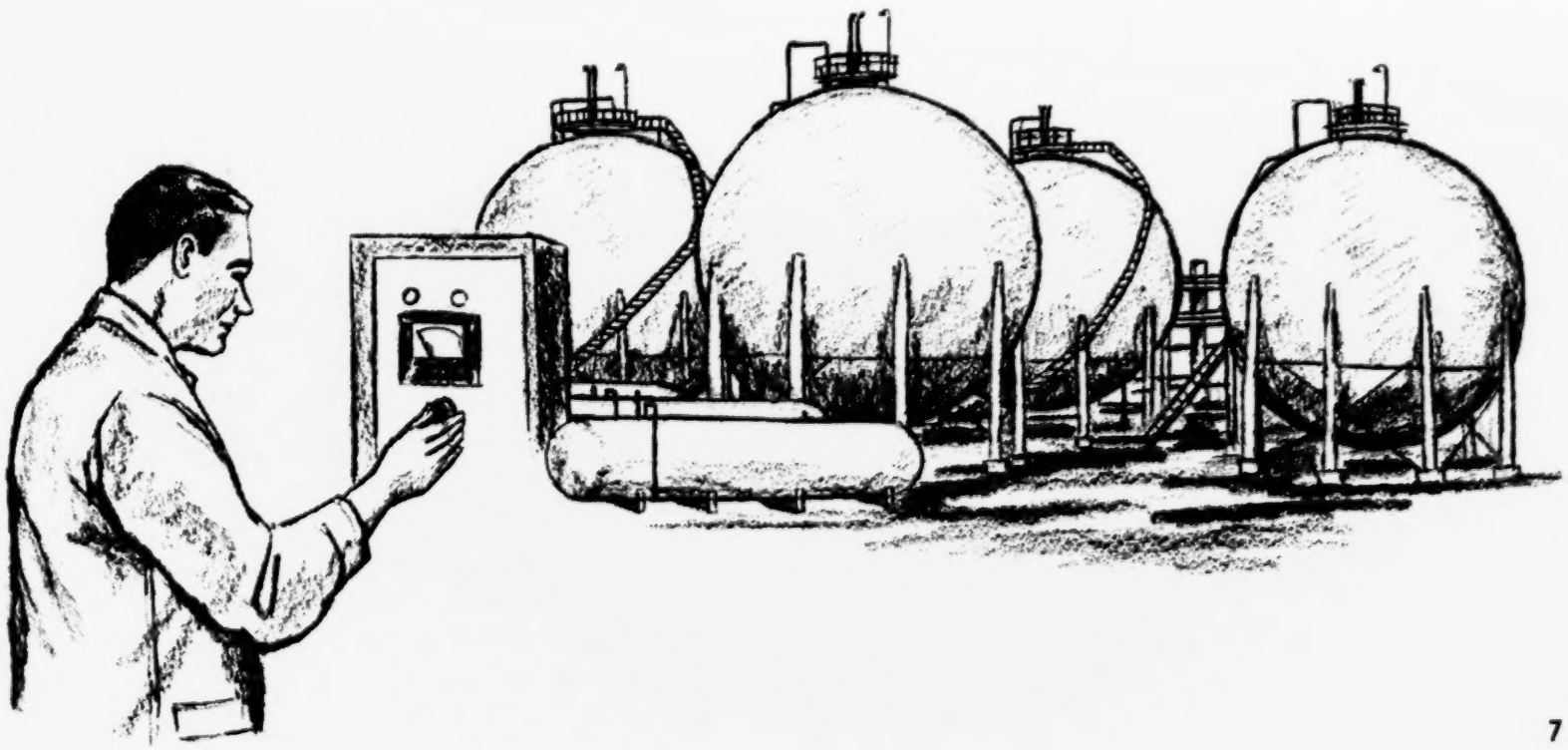
As an engineering technology student, you will have job interviews during your last school term—perhaps weeks before you graduate. Most schools have part-time or full-time placement officers who arrange for recruiters to interview you on campus. Sometimes the recruiter may invite you to visit his organization. Private personnel agencies also welcome engineering technicians.

Employers will pay well for your services as an engineering technician. The tangible benefits of training in engineering technology are excellent, and the intangible benefits of personal satisfaction and the respect of others for your skill are equally rewarding.

Fields of Study

As a prospective engineering technician, you can choose from a wide selection of majors. The next section in this booklet will describe these fields of study and related positions in engineering technology. After each career description you will find a few typical job titles.

Please remember that each list represents only a small sample of the tremendous range of job possibilities. As an engineering technician you are trained for a whole cluster of positions in your chosen field.



Air Conditioning, Heating, and Refrigeration Engineering Technologies

Air conditioning, heating, and refrigeration are three closely related engineering technologies which are growing more and more important in the modern world. All three deal with the control of environments—the control of temperature, humidity, cleanliness, and circulation of air.

People prefer to work in comfort, and air conditioning is now an accepted feature of our world in stores, offices, public buildings, buses, and airplanes. It is becoming commonplace in private homes and in automobiles. It also plays a vital part in space-exploration programs and other scientific applications.

Refrigeration is also growing in importance in the world. The low temperatures necessary to preserve food have become essential to us. The relatively new science of cryogenics—the study of the effects of extremely low temperatures—is developing rapidly, with applications in computer technology and space technology.

Heating has always been important to man, and today it is enjoying rapid growth due to the development of new methods and materials.

Thus, air conditioning, refrigeration, and heating engineering technologies offer you a wide range of careers. You might work with the latest innovations and improvements in heating, ventilating, and cooling homes, offices, and factories; or with environment control for processing equipment (such as in food packaging and electronic assembly) or for space capsules.

Typical Positions Open to Recent Graduates

Controls specialist—installs, services, or sells electric, electronic, and pneumatic controls.

Development technician—works closely with design engineers in testing and evaluating new applications and new equipment.

Heat pump specialist—installs, sells, and services reverse-cycle equipment for both heating and cooling applications.

Research assistant—works with research engineers and scientists in experimental laboratories.

Positions Open to Experienced Engineering Technicians

Application specialist—works as a manufacturer's representative to aid contractors, installers, and servicemen in proper application of complex temperature and air control equipment.

Dealer and contractor—operates his own business, selling, installing, and servicing air conditioning, heating, and refrigeration equipment.

Installation supervisor—coordinates installation of heating, cooling, or refrigeration specialized systems.

Systems designer—makes surveys, calculates loads, specifies equipment, or writes proposals for use of heat-transfer systems.

Architectural and/or Building Construction Engineering Technologies

These two engineering technologies provide us with one of our basic needs—shelter. They deal with the design and construction of homes, factories, schools, stores, and public buildings and projects.

These two technologies also are concerned with upkeep, repair, modification, and modernization of existing buildings.

Our exploding population is creating a pressing demand for new buildings and structures. As an architectural or building construction technician, therefore, you will have numerous career opportunities.

You might work in the large and diverse building design and construction industry. You might work with architects and engineers, with building contractors, or with manufacturers or distributors of building materials.

Typical Positions Open to Recent Graduates

Architect's or contractor's assistant—helps plan, design, and supervise construction of buildings, and makes progress inspections.

Architectural draftsman—works with architects in drawing plans for homes, apartments, schools, and other types of buildings.

Building inspector—represents city, county, or state governments in inspection of new or existing construction to ensure compliance with codes, plans, and specifications.

Estimator—assists contractors in preparing bids and in determining best methods of performing particular jobs.

Materials man—purchases and distributes materials on construction jobs.

Positions Open to Experienced Engineering Technicians

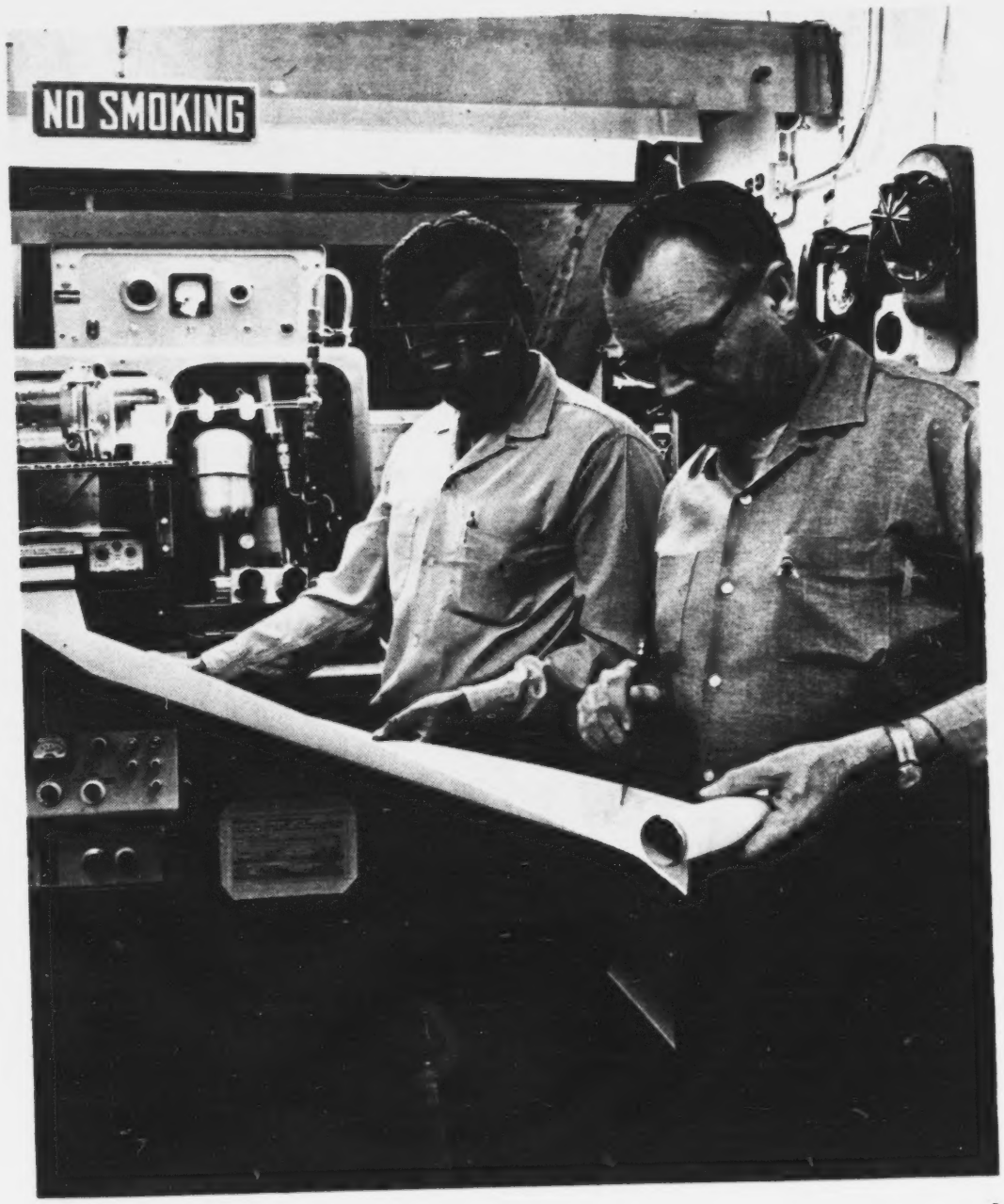
Architectural design draftsman—translates architects' ideas into presentation and detailed working drawings.

Building supplies and equipment salesman—represents manufacturers in the sale of construction equipment, building materials, and supplies.

Construction superintendent—supervises and coordinates the work involved in building construction.

Contractor—operates his own commercial or industrial construction business.

Plant engineering supervisor—works in large industrial plants, drafting and coordinating alterations to plant facilities.



Two important members of the engineering team, a technician and a skilled craftsman, review test results.

Aviation/Aerospace Engineering Technology

The aviation/aerospace industry covers three related, but distinct, areas. Each area could offer you an excellent future as an engineering technician in one of the most exciting activities in our modern world.

Space exploration is the newest field in the aviation/aerospace industry—a field that is younger than you probably are now! Yet space exploration is already a vast, and still growing, undertaking which requires thousands of engineering technicians who work in locations from Cape Kennedy in Florida to Vandenberg Air Force Base in California. Others are employed at overseas sites. Space exploration includes not only manned flights but also weather and communications satellites. Truly, space exploration offers you a career which has no ceiling on opportunity.

Air transportation is also a rapidly developing area of the aviation/aerospace industry. Commercial passenger and freight air travel increase each year, and the use of private aircraft and helicopters is growing steadily.

The development of aircraft, missiles, and spacecraft is the responsibility of the manufacturing phase of the industry. And aircraft manufacturing is keeping pace with the growth of space exploration and air transportation. The equipment and techniques used in these areas are highly complex. A single airplane may have over half a million parts. Aircraft manufacturing has become more and more a research and development industry. Thus, the need for engineering technicians has grown rapidly.

A skilled technician assists an engineer in assembling components for a reduced pressure test.

Typical Positions Open to Recent Graduates

Aircraft systems test technician—operationally tests and evaluates hydraulic, pneumatic, and electrical systems in special applications to meet a wide variety of requirements.

Aircraft weights technician—determines the weight and balance of aircraft on basis of design and materials.

Jet powerplant technician—operates, inspects, and evaluates powerplant equipment.

Technical writer—investigates systems and components, and analyzes their operation; establishes operational, maintenance, and servicing procedure; then develops reference publications and manuals for users.

Positions Open to Experienced Engineering Technicians

Aerodynamics technician—based on experience as a designer, works with engineers in using advanced wind tunnels and instrumentation to establish standards for safe, reliable vehicles.

Aircraft maintenance inspection technician—inspects maintenance operations; establishes standards and devises procedures for maintenance; approves repair, overhaul, and modification techniques.

Aircraft structures analyst—calculates, analyzes, and evaluates the materials and structures used in the development of new aircraft and space vehicles.

Design engineering technician—aids in developing the aircraft or missile with the data furnished by stress analysts, structural analysts, and aerodynamicists; plans production and prepares engineering work orders.

Stress analyst—uses computations and laboratory tests to determine the design requirements for selecting materials and setting up specifications.

Structural design technician—uses knowledge of materials and the mechanics of physics to aid in developing a structure to withstand the requirements of its mission.

Chemical Engineering Technology

The chemical industry investigates new materials to determine their properties, characteristics, reactions, and possible applications. This industry processes or manufactures raw materials and finished products for consumers and for other industries.

Research and development work, an important factor in this important modern industry, has led to thousands of new products and processes. Research work is continuing to apply chemical technology in leather and paper manufacturing, plastics and synthetic fiber production, food and beverage processing, petroleum chemistry, and other areas.

Chemical engineering technology offers engineering technicians exciting careers across a broad spectrum.

Typical Positions Open to Recent Graduates

Chemical engineering technician—works with chemical engineers in consulting firms and individual plants to design new chemical processes and improve existing processes.

Chemical technician—sets up equipment for advanced experiments, prepares chemical samples, or gathers and analyzes results of chemical tests.

Control analyst—analyzes the processes of producing chemical materials; tests samples of raw materials to be used.

Positions Open to Experienced Engineering Technicians

Chemical instrument salesman—sells, services, and coordinates development of new process and operation instrumentation.

Chemical salesman—as above, but sells and coordinates development of chemicals (fine, heavy, and specialties).

Development technician—assists engineers and chemists in developing new processes, improving existing processes, and carrying bench "curiosities" into pilot plant and/or full-scale production.

Pilot plant operator—operates equipment in research and development of new products and processes.

Production supervisor—instructs and directs others involved in chemical manufacturing.

Research assistant—assists research chemists in all phases of investigation—operation of experimental equipment, data reduction, graphic and mathematical calculations, and library research.

Civil Engineering Technology

Civil engineering technology is—after military engineering—the oldest branch of engineering. Yet, it is as modern as the prestressed concrete in a bridge being built this week. Civil engineering technology is one of the broadest fields in engineering because its work affects so many other fields of engineering.

Civil engineering concerns the planning, design, and construction of fixed structures and ground facilities for land, sea, and air transportation; and control of the flow and uses of water for flood protection, power generation, and recreation. Indeed, every time you fill a glass with water from a faucet, or drive along a new highway, you are sharing in the benefits of civil engineering.

Civil engineers and civil engineering technicians build airports, bridges, highways, dams, powerhouses, pipelines, and railroads. Thus, civil engineering technology requires skills in hydraulics, steel, concrete, and earth structures, field surveying, traffic studies, and computations.

As a civil engineering technician, you might draw up plans and specifications; estimate costs and materials needed; use the transit, level, and other surveying instruments; prepare maps; and inspect jobs.

Typical Positions Open to Recent Graduates

Civil engineers' aide—assists civil engineers in estimating, drafting, and other office tasks; aids civil engineers in field studies and site inspection.
Computer—determines coordinates for geographic position, land lines, and land monuments; computes quantities for cut and fill of earth.
Contractor's aide—works with contractor on construction projects.
Detail draftsman—prepares plans and detail drawings for elements in construction projects.
Estimator—estimates amounts and costs of materials, supplies, and labor for construction projects.
Inspector—inspects line and grade references, forms, materials, and construction methods.
Junior surveyor—works with registered surveyors and engineers.

Positions Open to Experienced Engineering Technicians

Construction supervisor—supervises light and heavy construction projects.
Highway engineering technician—runs surveys, prepares plans and estimates, supervises construction and maintenance of highways.
Photogrammetrist—prepares maps and charts from aerial photographs.
Specifications writer—writes specifications for construction jobs.
Structural designer—develops, under the supervision of a licensed engineer, structural designs for bridges, roads, and other large projects.

Electrical Engineering Technology

Every time you turn on a light, watch television, or operate an electric motor, you are using a product based on electrical engineering technology. The electric power industry is the basis of practically all modern industrial expansion. Therefore, electrical engineering will continue to broaden in scope and application.

The electric power industry primarily concerns the generation, transmission, distribution, and use of electricity. Through the benefits of electric power, you enjoy equipment and appliances that Abraham Lincoln did not have in the White House.

Yet, you probably experience only the everyday benefits of electrical engineering. New applications for electric power are developing in electric controls and automation for industry, in the illumination field for specialized commercial and industrial installations, and in the relatively new field of nuclear power generation.

As an electrical engineering technician, you will find many career opportunities in this vital, modern industry.

Typical Positions Open to Recent Graduates

Communications technician—installs, maintains, and operates electrical communications equipment.

Electrical draftsman—prepares working plans for wiring diagrams for the erection, installation, and wiring of electrical machinery.

Illumination technician—supervises the installation and maintenance of commercial and industrial lighting systems.

Test technician—tests equipment, materials, and processes to determine whether they meet specifications and accepted engineering standards.

Positions Open to Experienced Engineering Technicians

Electrical contractor—owns his residential, commercial, or industrial electrical contracting business (in most locations must be a licensed electrician).

Electrical designer—designs and develops drawings for electrical lighting and service systems; submits these plans for engineering approval; assists in preparing specifications.

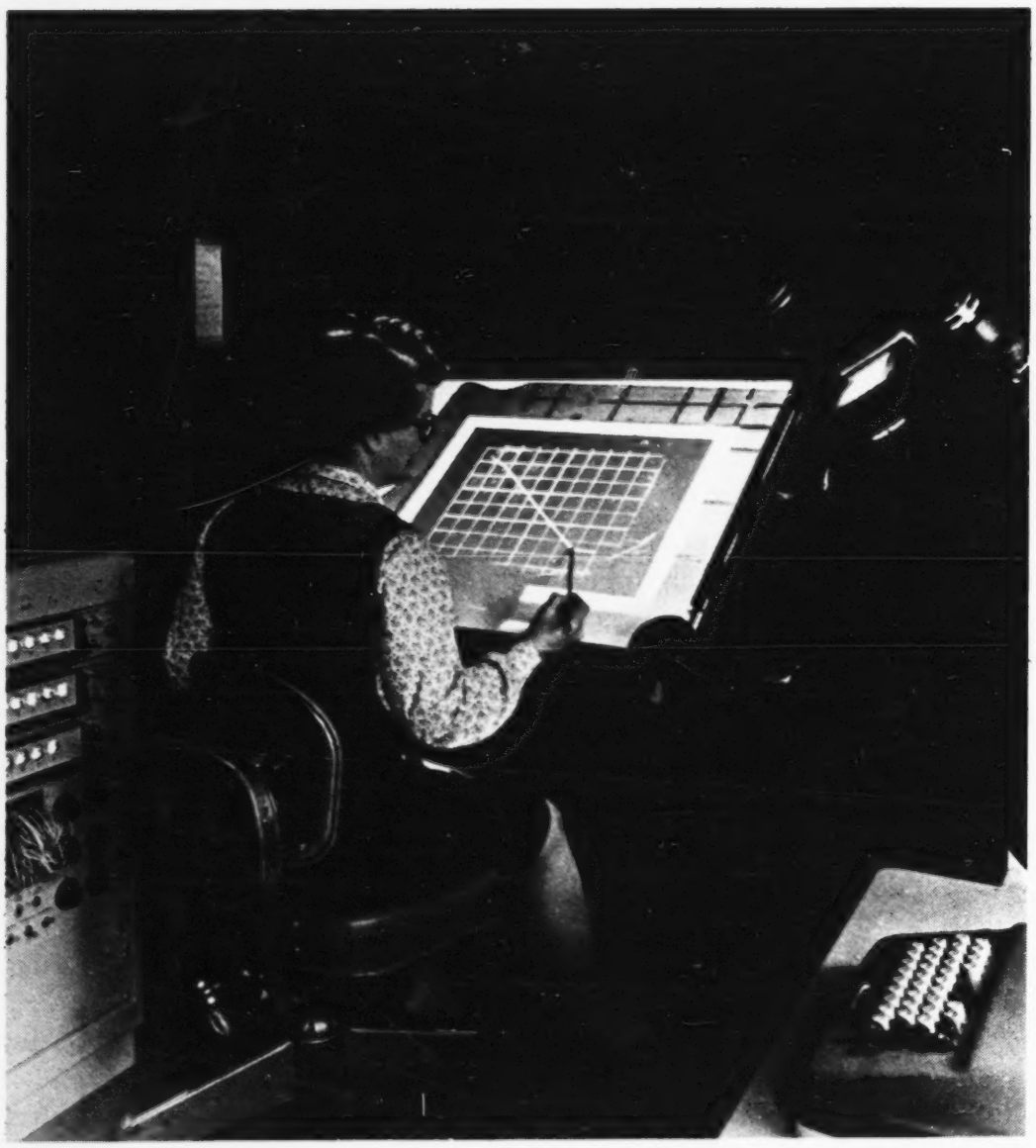
Electrical estimator—works with engineering firms, building supply companies, and others in preparing materials takeoffs and cost estimates from drawings and specifications.

Manufacturer's sales representative—sells electrical and related products and lines of products to large contractors, plant maintenance departments, and building supply companies.

Powerhouse load dispatcher—controls the operation of power stations, substations, and transmission lines within an electric power system.

Research technican—works with scientists and engineers to develop new equipment and to evolve new applications in manufacturing processes.

Technical writer—works with engineers in compiling manuals, reports, bulletins, specifications, and catalogs for the electrical industry.



An engineering technician must use highly sophisticated methods to analyze test data.

Electronics Engineering Technology

Electronics is a relatively new science, but it has given birth to a rapidly growing industrial giant. The telephone, radio, television, radar, radio astronomy, and missile guidance are but a few fields based on electronics.

The demands for new commercial, industrial, and military applications of electronics are growing rapidly. This increasing demand has created a need for electronics engineering technicians in all phases of research, development, design, production, and maintenance.

You are living in the age of the computer—an age developing around high-speed electronic mathematical and control equipment. Thus, as an electronics engineering technician, doors will swing wide and offer a variety of career opportunities.

Typical Positions Open to Recent Graduates

Communications technician—installs and operates various types of communications equipment.
Customer-service technician—installs and maintains electronic computers and related equipment.
Electronic engineering aide—assists engineers in the design, development, and testing of new electronic equipment.
Medical electronics technician—installs, tests, and maintains electronic equipment used in medical research and diagnosis.

Positions Open to Experienced Engineering Technicians

Broadcast technician—operates and maintains electronics equipment in radio and television studios and transmitters. (You must have a license for this job.)
High-frequency technician—maintains and operates radar, sonar, loran, and other warning and detection devices.
Research engineering technician—builds and tests new equipment in fields such as geophysics, precision testing, and guidance systems.
Technical sales representative—sells and services electronic equipment and components to industry; advises customers in selecting equipment or entire systems.
Technical writer—compiles reports, bulletins, specifications, and manuals pertaining to electronic equipment; works closely with project engineers.

Electronics and Computer Technology

The electronic computer is a powerful mathematical tool which is helping us to shape our modern world. At first purely a research tool, the computer has found broad applications in defense, business, and industry. Your bank statement will almost surely be computerized; so will your gasoline credit card purchases, and probably your charges at large department stores.

Computer technology is also being used to control automated processes in many industries such as chemical processing, food processing, metal manufacturing, and atomic energy.

The wide range of applications for which computers are being used in our technological world has created careers for engineering technicians in many areas of government, business, and industry.

Typical Positions Open to Recent Graduates

Design specialist—works with research engineers who design and evaluate instruments and control devices for automatic equipment.
Field engineering assistant—installs, tests, and maintains data processing machines in customers' facilities; recommends best methods of operation and application to customers.
Process control technician—operates or supervises the operation of electronic control equipment for industrial processes.

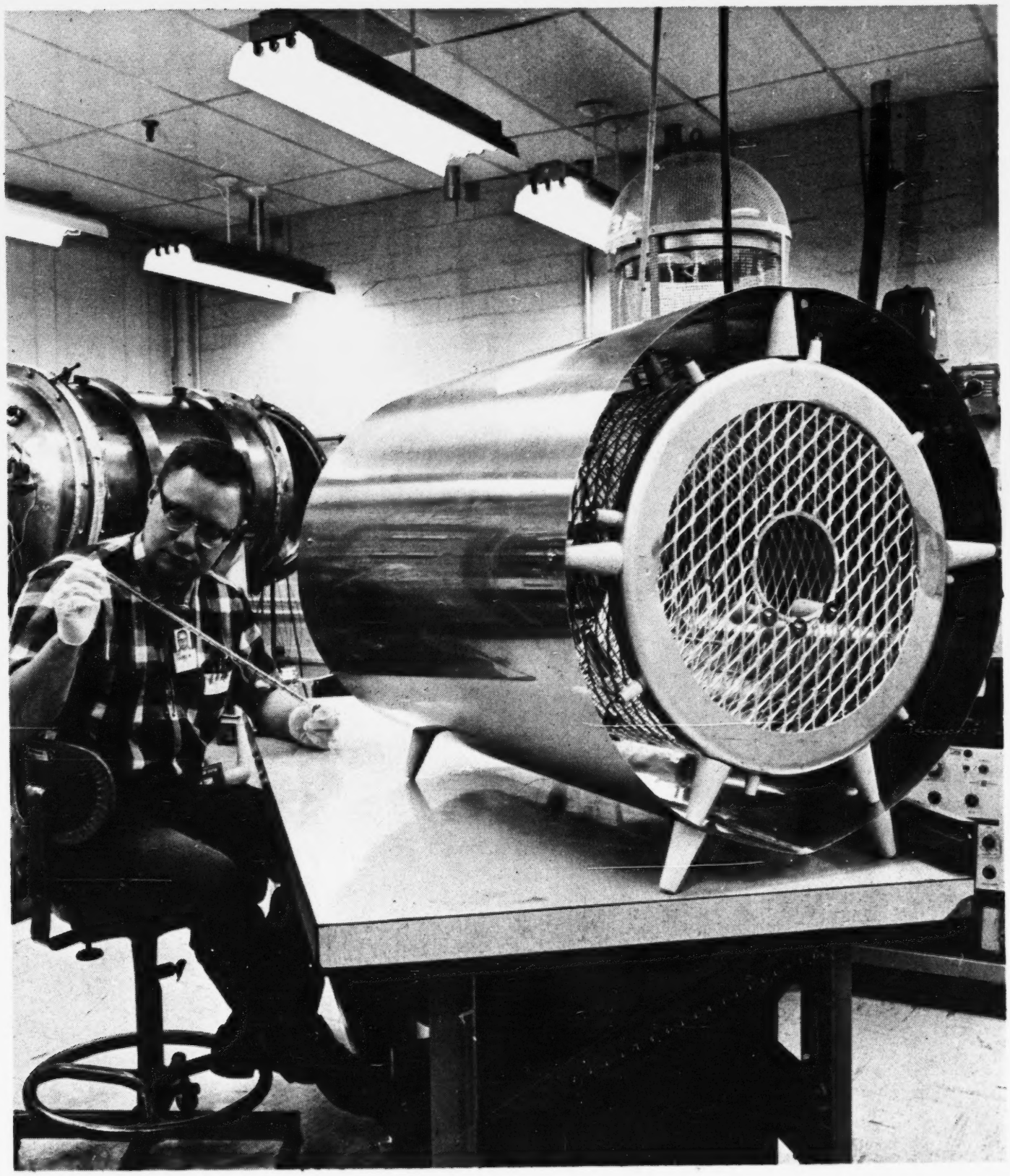
Positions Open to Experienced Engineering Technicians

Customer representative—contacts prospective users of data processing equipment; plans systems to meet customers' needs.

Research and development technician—builds, tests, and experiments with component circuits for computer systems.

Test equipment development technician—devises equipment and methods for production testing of complex electromechanical systems.

This engineering technician is examining a component before placing it in a high-heat testing device.



Fluid Power Engineering Technology

The National Fluid Power Association has defined fluid power as "the art of generating, controlling, and applying smooth, effective power of pumped and compressed fluids (like oil and air) as used to push, pull, rotate, regulate, or drive the mechanisms of modern life."

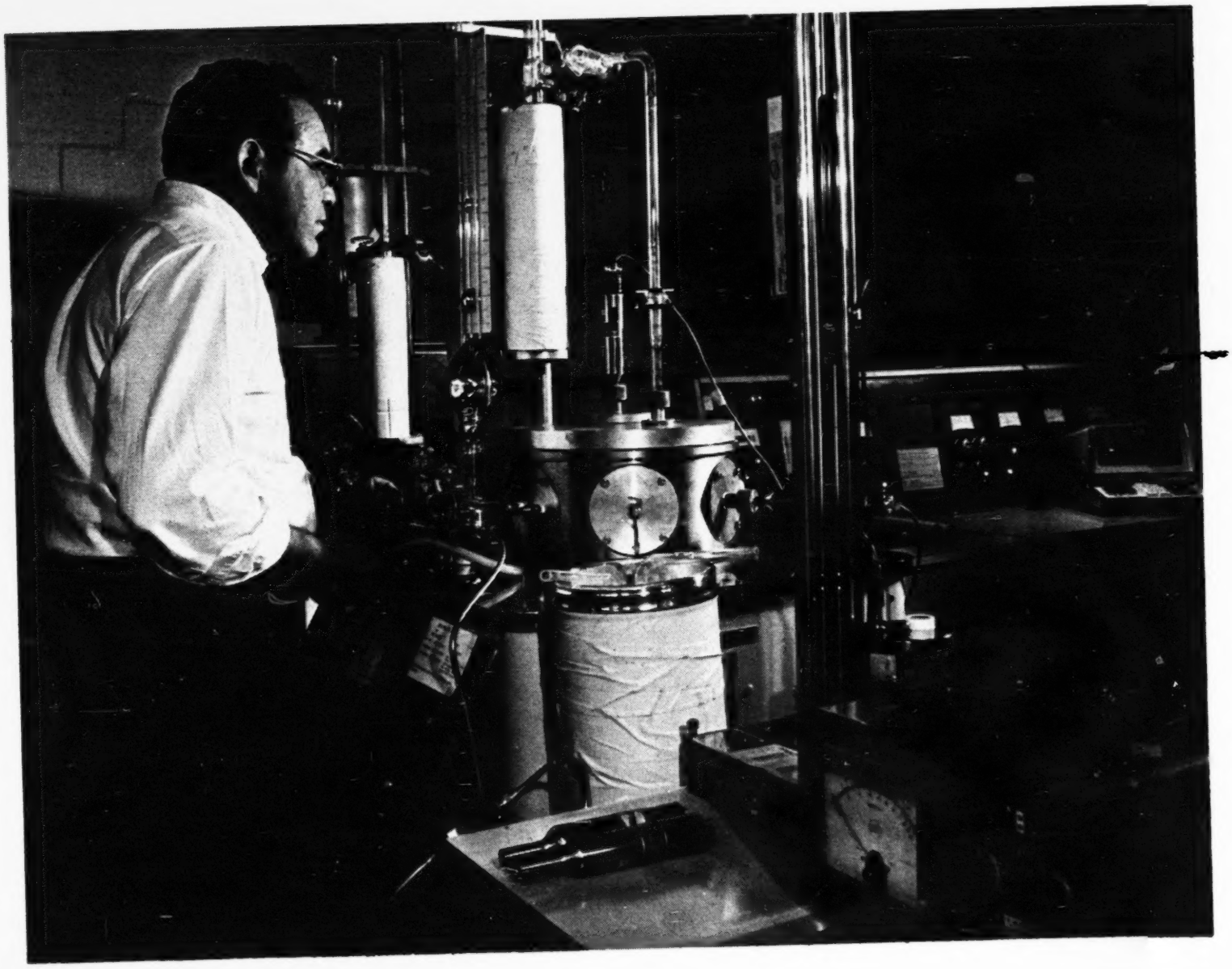
These impressive developments are based on the work of a 17th-century French scientist, Blaise Pascal, who demonstrated that pressure exerted anywhere on a confined fluid is transmitted undiminished in all directions, acting with equal force on all equal areas. Today, applications of the principles of fluid power insure that billions of dollars worth of appliances, equipment, and machines function efficiently in industrial and manufacturing enterprises, in national defense systems, in building and construction projects, in transportation and agriculture, and in homes and garages.

The nation's urgent needs for more power and increased production, with lower costs and less waste, require greater use of fluid power. Continuing advances and refinements in automation and design simplification will lead to the development of new applications for fluid power.

These factors continue to increase the demand for fluid power engineering technicians to fulfill specialized capacities in research, development, testing, production, and operation.

The young and growing fluidics industry, which deals with hydraulics and the control of machinery through fluid power, also needs technicians trained in fluid power engineering.

An engineering technician is highly skilled in the operation of instruments used to gather important data.



Typical Positions Open to Recent Graduates

Design technician—sketches designs and prepares drawings for the development of fluid power components and systems.

Development technician—assists engineers in developing experimental fluid power components and systems.

Field service technician—installs and maintains fluid power systems; serves as manufacturer's representative.

Fluid power technician—inspects, operates, and services fluid power equipment in various industrial applications.

Laboratory technician—outlines, plans, sets up, and conducts fluid power laboratory research and evaluation tests.

Technical writer—prepares operating manuals and instructions for the operation of fluid power components, equipment, and systems; writes articles for technical publications.

Positions Open to Experienced Engineering Technicians

Laboratory supervisor—outlines and directs the performance of laboratory research experiments to develop advanced hydraulic components or systems.

Research technican—performs interesting work in the area of industrial applications of fluidics, in such activities as the fabrication, molding and etching, and nodular construction of multiple fluidic devices.

Sales customer engineer—assists customers in specifying design of hydraulic or pneumatic systems and components; assists in the installation, check out, testing, troubleshooting, and periodic inspection of systems and components.

Industrial Engineering Technology

As our world becomes more and more complex and technologically oriented, the smooth flow of men, materials, and products continues to grow dramatically in importance.

Efficiency in business, industry, and government is a major concern of industrial engineering. This "production science" looks for ways and means to get things done promptly, efficiently, at minimum cost, and with a well-designed end product.

Industrial engineering technology, then, involves the coordination of industrial and business equipment with the men and women who operate that equipment. As an industrial engineering technician, you will be concerned with products and work sequences at many stages—from a properly completed purchase order to a booster rocket for outer space.

As an industrial engineering technician, you will know how to manage industrial activities—to control cost and quality of output; to eliminate waste of time and material; and to perform time and motion studies and analyses of costs. In general, you will know how to take the steps necessary for efficient and profitable coordination of men and equipment. You and the management of your organization would never be satisfied—you would continually try to prevent lost motion and to improve work flow.

Typical Positions Open to Recent Graduates

Methods technician—studies the effectiveness of various manufacturing processes; seeks out and develops means to achieve economy and efficiency.

Personnel counselor or interviewer—evaluates the skills and qualifications of job applicants; administers placement and advancement tests.

Plant layout man—works with industrial engineers and with top plant management in planning location of machines, equipment, and materials-handling devices.

Production planner—makes up schedules; estimates rate and cost of production; maintains production cost and control record systems.

Safety technician—inspects to insure that safety practices are being observed; aids in improving current practices and in developing safety standards for new processes and equipment.

Time study technician—calculates time required for industrial or manufacturing processes; studies efficiency of materials handling and of arrangement of tools and equipment.

Positions Open to Experienced Engineering Technicians

Assistant production manager—coordinates phases of production, supervision, receiving, shipping, scheduling, and control of materials.

Manufacturing foreman—supervises machine operators, assemblers, and other employees in manufacturing processes.

Production foreman—supervises departments, assigns duties, inspects work for quality and quantity; interprets blueprints, sketches, and written orders; determines work procedures.

Wage administration technician—aids in drawing up job-evaluation and wage-incentive plans.

This engineering technician designed the data recorder that he is examining.

Mechanical Engineering Technology

Mechanical engineering technology concerns the generation, transmission, and utilization of mechanical energy; and the design and production of tools and machines and their products. Thus, mechanical engineering technology enters into many business, industrial, and community activities.

As a mechanical engineering technician, you will hold a responsible job in making products affecting almost every facet of our lives—ranging from mechanical pencils to Saturn rockets, from nuts and bolts to freight trains and ships, from your car to the huge generators in hydroelectric plants.

Therefore, as a mechanical engineering technician, you will have many fine career opportunities.

Typical Positions Open to Recent Graduates

Estimator—computes costs of labor, material, equipment, and installation in preparing bids for metal fabrication and steel work.

Mechanical draftsman—drafts from specifications rough sketches of proposed mechanical devices and scale drawings of parts of machines.

Mechanical technician—assists in setting up equipment necessary for making tests of materials.

Positions Open to Experienced Engineering Technicians

Die designer—designs or makes drawings of dies necessary to form a stamping, forging, or other part.

Equipment or machinery salesman—sells complex and costly machine tools or other large pieces of equipment; uses his technical knowledge in matching his customer's needs against his product.

Machine designer—designs machines and instruments for industry.

Metals-processing technician—specifies methods of processing metals for best design results.

Metallurgical Engineering Technology

Since the beginning of history, man's ability to survive and progress has depended on his ability to develop materials to suit his purpose.

Man's future progress depends on his ability to produce new materials of predictable behavior and to function in environments hitherto unknown. His progress, therefore, depends on a supply of technicians who understand the attributes of metals and materials and can use this understanding to produce the necessary materials and put them in whatever form is required.

Metallurgical engineering technology involves the study of why metals and other materials behave as they do, how this behavior is affected by environment, and how it can be changed.

The metallurgical engineering technician studies to learn what materials are made of, down to the individual atom or ion. He seeks to understand how these atoms are made to assume definite position in a crystalline structure, and how individual crystals are built up to form the final shape. He learns what changes in structure will affect the behavior, and how these changes can be accomplished. He uses tools such as the spectroscope, microscope, X-ray, and chemical analysis to probe into the very soul of the material and analyze its being. He uses forces such as heat and pressure to reform the material to suit his requirements. His field can range from the production of 200-ton castings to the growth of single crystal "whiskers." He is the one on whom all technologies must rely to furnish them with the materials they require.

Typical Positions Open to Recent Graduates

Assistant metallurgist—assists in examining and testing metals and alloys to determine their physical properties; prepares and collects statistical data on metals.

Development technician—devises new methods of processing materials and develops equipment for such processing.

Laboratory technician—assists in maintaining control over processes; analyzes materials and performs physical tests to insure conformance to specifications.

Metallurgical technician (design)—assists design engineers in selecting proper materials for use in new products.

Quality control technician—assists in maintaining quality in industries producing metal products; analyzes defects and applies corrective techniques.

Research technician—assists in originating new materials; designs and develops methods for producing, fabricating, and testing new materials.

Specification writer—writes specifications for materials to meet the requirements of designers.

Positions Open to Experienced Engineering Technicians

Casting salesman—assists customer in the design of castings which are physically sound and economical to manufacture.

Heat treatment supervisor—supervises heat treatment of all types; devises heat treat methods to meet physical requirements of metals.

Laboratory supervisor—assumes responsibility for all chemical and metallurgical analyses, as well as physical testing.

Plant metallurgist (foundry)—responsible for all technical aspects of casting production.

Evaluation of test results is an important facet of the technician's job.

Nuclear Engineering Technology

In recent years, the use of nuclear energy has moved from a laboratory idea to a weapon to peaceful industrial use. The building of nuclear power plants is but one example of this movement. Nuclear energy is finding many other applications in industry and medicine.

This new and challenging field of nuclear engineering has outgrown the supply of qualified manpower, and particularly the supply of qualified engineering technicians. A number of schools now offer nuclear engineering technology programs. These programs provide training in nuclear physics, chemistry, electronics, and instrumentation.

The continuing growth of nuclear energy applications in industry means promising careers open to you. As a nuclear engineering technician, you will have a career assured by the tremendous potential power of the atom itself.

Typical Positions Open to Recent Graduates

Chemistry laboratory technician—works with chemists in developing and producing radiological compounds.
Control technician—works with control and instrumentation engineers.
Instrument repair and maintenance technician—repairs and maintains radiation instruments.

Positions Open to Experienced Engineering Technicians

Laboratory supervisor—supervises work of other technicians.
Radiation safety technician—works with engineers and scientists in the operation of nuclear reactors.
Salesman—sells instruments for radiological usage; fits his product lines to needs of individual and governmental customers.

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